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Dear Sir:

Enclosed please find three (3) copies of Progress Report No. 7 on our Project No. A-100 covering the month of July, 1957.

Expenditures during the month of July amounted to $1900.00, leaving an uncommitted and unexpended balance of approximately $12,500.00.

Sincerely yours,

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RWB:rlg
Encl. (3)

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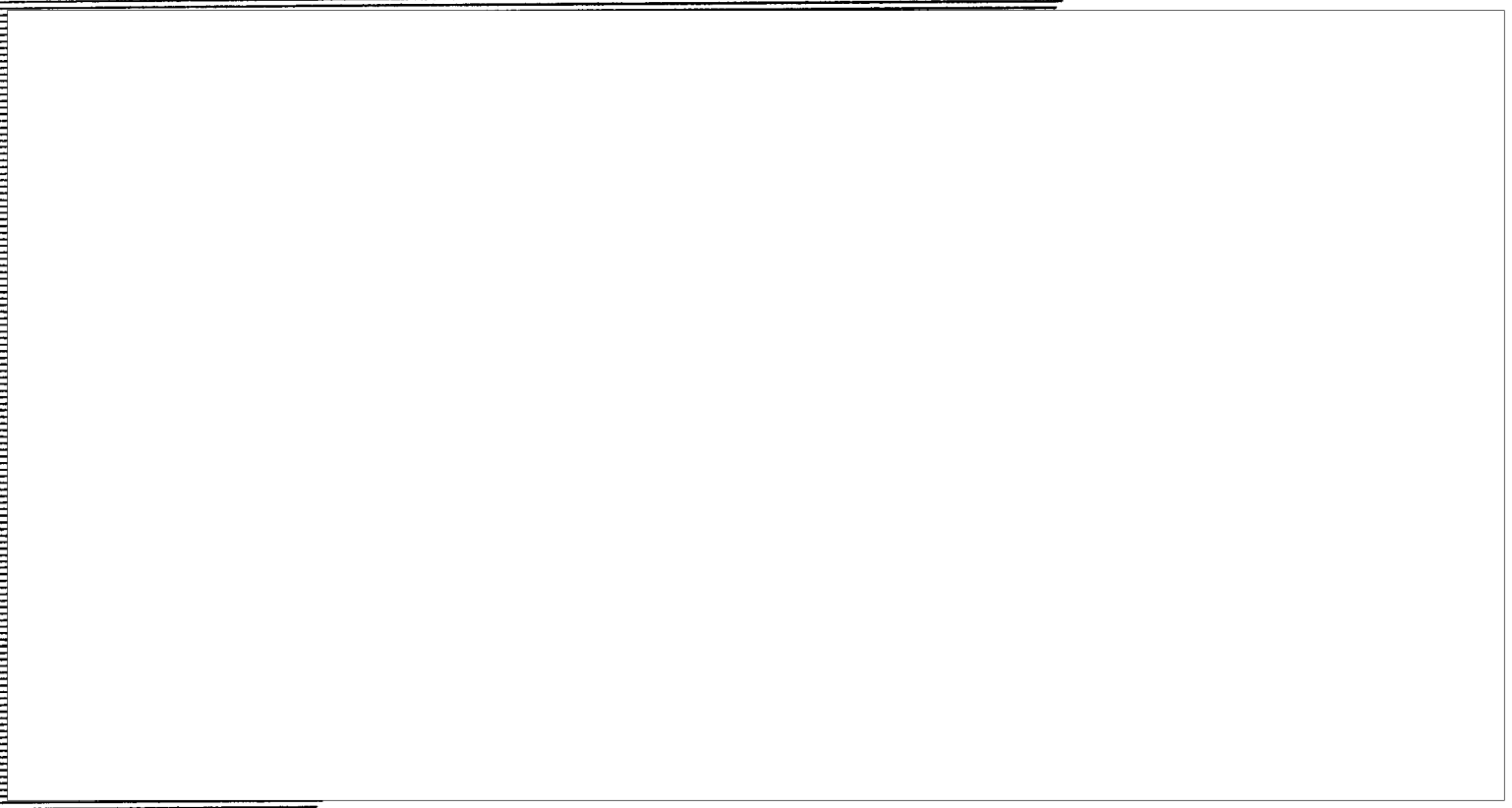

Project No. A-100

THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

Progress Report No. 7

for

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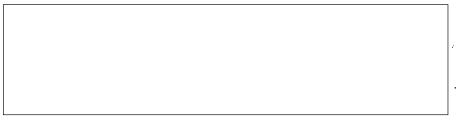

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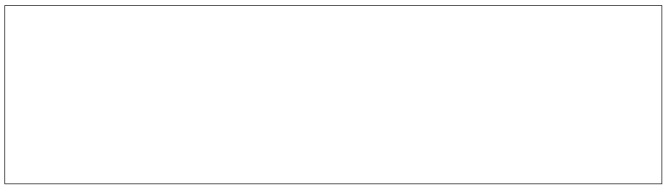

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Project No. A-100

THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

Progress Report No. 7

for

25X1

Copy No. 1

September 11, 1957

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THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

I. INTRODUCTION

This is a report of the progress on [redacted] Project No. A-100 for the period from July 1 through July 31, 1957. The purpose of this project is to develop an ultrasonic method for the thickness measurement of non-metallic materials where access is had to only one face of the object whose thickness is to be measured.

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II. PROGRESS

Although a continuous literature survey has been kept with regard to ultrasonic thickness measurements, particularly in non-metallic materials, extra time has been devoted to this aspect in the past month. Nothing of prime importance has been found. A new thickness gauge for concrete, using a pulse technique, is on the market in Germany, but it again is a through instrument, using a receiver on the far side of the sample. Although details are vague, there seems to be no new principles involved. A passing reference, in the business edition of ELECTRONICS for February 10, 1957, to an ultrasonic micrometer for measuring wall thickness developed at General Electric has been traced down, with the help of a telephone conversation, to a device operating in metals which was previously noted by our group.

Our attempts to mechanically damp the transducing ceramic seem to have progressed as far as is possible with the pulser that we have been using. The aid of the [redacted] 25X1 has been asked in developing a better pulser for our purposes. 25X1

While waiting for the electron pulse generator, further investigations have been conducted on resonance techniques. A new system has been used with three transducers. The first transducer functions solely as a source of ultrasonic waves. The second transducer, a thin one (0.1 inch) of the same diameter as the first, is placed between the transmitter and the concrete in order to sense the phase of the entering wave. A third transducer acts as a receiver and the phase of its output is compared, on an oscilloscope, with that of the input-sensing transducer. Indications of resonance were obtained on both three inch and six inch concrete blocks. The indication on the six inch block was clear and did allow a thickness determination. The resonance on the three inch block was obscured by other resonances or apparent resonances of unknown origin and the desired resonance could not be identified without recourse to other measurements involving access to the far side of the block. Measurements were also made on one wall of the laboratory. An indication of a 6.7 inch thickness was obtained, while the wall is nominally 8 inches thick. The result was not followed up. The thickness indication may have been a spurious one or the concrete may have had an exceptionally high velocity of sound, but the far side of the wall could not be reached to verify the

results. In any case the results were not clean and further investigation using our block samples is indicated.

III. FUTURE WORK

Work during the next month will be concentrated on the problem of the electronic circuitry, particularly that used for pulsing. Attempts will be made to achieve damping by feedback or the use of a cut-off tube.

IV. NOTEBOOKS

The work reported here is being recorded in [redacted] Notebooks No. C-6529 and No. C-6880. 25X1

V. CONTRIBUTING PERSONNEL

The project is under the supervision of [redacted] 25X1

The work on the transducers is being done by [redacted] 25X1

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Respectfully submitted,

[redacted]